U.S. Department of Housing and Urban Development
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The Potential of Downpayment Assistance for Increasing Homeownership Among Minority and Low-Income Households

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Prepared for:

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Prepared by:

Christopher E. Herbert
Winnie Tsen

Abt Associates Inc.
Cambridge, MA

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Executive Summary

Research has consistently found that a lack of wealth is among the most important factors limiting households from becoming homeowners. In recognition of the importance of the wealth constraint in limiting homeownership, the American Dream Downpayment Act was enacted in 2003 to provide downpayment assistance through the HOME Investment Partnerships Program to eligible low-income households. Nonetheless, there is actually little research that has evaluated the potential impact of downpayment assistance on homeownership rates.

Purpose of Study

The purpose of this study is to investigate the potential for downpayment assistance efforts, like that provided through the American Dream Downpayment Act to increase homeownership, both overall and among the low-income and minority households that are of special concern to policy makers. There are several ways in which this study adds to existing research. First, it evaluates the potential of downpayment assistance programs to stimulate homeownership by measuring the impact of cash grants on the propensity to own. Second, most tenure choice studies use cross-sectional samples of both owners and renters. But homeowners' wealth will at least in part be the result of homeownership rather than a cause. In contrast, this study avoids the endogeneity of wealth and homeownership by focusing exclusively on a sample of renter households. Third, by tracking renter households over time it captures the ability of households to accumulate savings, reduce expenses, and/or increase income to achieve homeownership – dynamic aspects of the tenure transition process that are not captured by cross-sectional analysis. Finally, the period of study, 1997 to 2000, is a time when there was growing availability of low downpayment mortgage products. Thus, the study sheds light on the importance of wealth constraints at a time when renters could benefit from these mortgage market innovations.

Methodology and Data

The study analyzes data from the 1996 Panel of the Survey of Income and Program Participation (SIPP). The SIPP is a nationally representative, longitudinal survey of households that gathers detailed information about their income and wealth as well as other characteristics. Of particular interest for this study, the 1996 SIPP included detailed questions about household assets and liabilities once each year. The sample used for this study consists of some 11,000 renter households as of the last quarter of 1996 and tracks their tenure choices (that is, whether they own or rent) every three months through February 2000. Over the more than three-year period studied, 18 percent of the sample became homeowners. The sample includes large numbers of low-income, black and Hispanic households, making it possible to analyze the tenure choices of these groups separately.

The analysis has two stages. In the first stage, a parametric proportional hazard model is estimated of the transition to homeownership based on a variety of demographic and financial characteristics of each household as well as economic conditions in the markets where they live. Of particular importance are measures of each household's liquid financial wealth. In the second stage, the results of the hazard model are used to simulate the impact of cash grants to households on the probability of

becoming a homeowner over time. The simulations are run for all renter households as well as for sub-groups of low-income, black, and Hispanic households.

Findings

Results confirm that liquid financial assets (e.g., amounts held in savings or checking accounts, certificates of deposits, mutual funds, etc.) are statistically significant predictors of homeownership. But while the importance of wealth in predicting homeownership is in keeping with the findings of previous research, a somewhat surprising finding of this analysis is that the largest impact on the probability of homeownership was associated with savings between $0 and $1,000, while savings between $1,000 and $5,000 had a lower marginal impact on this probability, savings between $5,000 and $20,000 added only slightly to the likelihood of buying, and savings above $20,000 had no statistically significant impact.

The pattern is somewhat surprising as $1,000 would appear to be a trivial amount of money compared to the cost of a home when the house value in the markets studied is about $120,000. Yet about half of the homebuyers over the three-year period had less than $1,000 in liquid assets at the start of the period. What might account for this pattern? One possibility is that given the growing availability of low downpayment mortgages, relatively little wealth is, in fact, needed to purchase a home. Another possibility is that the act of savings signals the desire on the part of a household to become a homeowner. While the level of liquid financial assets is low when we observe it, households may be able to accumulate savings fairly rapidly in the months leading up to home purchase – a run up that may not be captured by the once-a-year wealth estimates provided by the SIPP. It is also possible that households rely on gifts from family members, a source of funds that is not captured in the measure of wealth used to predict homeownership. Finally, it is also possible that the SIPP does not provide an accurate estimate of household wealth. While recent analysis of the SIPP does find shortcomings in this area, most of the undercounting is among wealthy households and so should not affect the wealth estimates of the low-income and low-wealth households of interest for this study.

Given the importance of low levels of liquid financial assets on the probability of homeownership in the estimated model, the simulations suggest that small amounts of downpayment assistance can be very effective at stimulating fairly large numbers of renter households to become homeowners. Downpayment assistance of as little as $1,000 is simulated to entice 700,000 additional low-income households to purchase a home, a 19 percent increase from the baseline estimate of the number of homebuyers absent any assistance. Reflecting the finding from the survival model that there is a diminishing impact of higher levels of savings on the probability of buying a home, higher levels of assistance do not have as large a marginal impact on the number of homebuyers. Assistance of $5,000 per household is simulated to increase the number of low-income homeowners by 600,000 (or an additional 15 percent) beyond the gain from $1,000 in assistance, while assistance of $10,000 is simulated to increase the number of buyers by an additional 250,000 (or 7 percentage points) beyond the gain associated with $5,000 in assistance.

While the simulation results are encouraging about the efficacy of downpayment assistance, if $1,000 in downpayment assistance were made available to all low-income households the cost of such a program could be quite high. If all low-income households were eligible for assistance, the cost would be as high as $4.5 billion over three years. But if assistance could be limited to only those

households who would only purchase with assistance (for example, by limiting assistance to those with little or no wealth) the cost would be a more reasonable $700 million over three years -- a level that is in keeping with the American Dream Downpayment Initiative that authorizes expenditures of up to $200 million per year.

The results also suggest that policy efforts to support savings efforts by households to accumulate the funds needed to buy a home, such as through individual development accounts, may also be an effective approach for enabling homeownership among low-income households. Such savings incentives could also be coupled with support for financial management training to help households develop the skills needed to manage their finances to the point where they can accumulate savings. The findings from this analysis suggest that a little savings can go a long way toward enabling homeownership.

1. Introduction

Research has consistently found that a lack of wealth is among the most important factors limiting households from becoming homeowners (Linneman and Wachter (1989), Listokin et al. (2002), Quercia, McCarthy and Wachter (2002), and Barakova et al. (2003)). Wealth is needed both to meet mortgage requirements for a downpayment and to pay for closing costs. The above referenced studies have found that a lack of wealth is more important in limiting homeownership than either having low income relative to area house prices or poor credit. In recognition of the importance of the wealth constraint in limiting homeownership, the American Dream Downpayment Act was enacted in 2003 to provide downpayment assistance of up to $10,000 through the HOME Investment Partnerships Program to eligible low-income households.

The purpose of this study is to investigate the potential for downpayment assistance efforts, like that provided through the American Dream Downpayment Act to increase homeownership, both overall and among the low-income and minority households that are of special concern to policy makers. There are several ways in which this study will add to existing research.

First, much has changed in the mortgage market since the early 1990s when policy makers at all levels of government began focusing on the goal of increasing homeownership among low-income and minority households. Both in response to pressure from the federal government and out of recognition of the market potential of low-income households, mortgage lenders began offering products that loosened traditional underwriting guidelines to expand the pool of households who could qualify for a mortgage. In particular, there has been significant growth in the number of mortgage products available that require downpayment levels of 5 percent or less of the mortgage balance. Many of the studies cited above relied on data from 1995 or earlier and so may not reflect changes in the importance of the wealth constraint due to changes in the mortgage market. This study makes use of panel data covering a period from 1997 through 2000, a period when many of these low downpayment products were becoming more widely available.

Second, most existing research has analyzed the tenure choice of a cross section of households at a point in time and associated the level of wealth at that point in time with the probability of being an owner. However, several studies have found that household wealth can change rapidly in anticipation of a move to homeownership, either due to increased savings or from gifts (Engelhardt and Mayer (1995), Haurin et al. (1996)). In addition, examination of panel study data has previously found that some households are able to purchase homes that would have appeared to be out of reach financially (Listokin et al., 2002). Studies that examine a cross section of households may not adequately capture this dynamic nature of household wealth and movements to homeownership generally. By using a panel of renter households over time, this study is able to track changes in wealth and relate these changes to the likelihood of becoming a homeowner.

Finally, existing studies have examined the potential impact of changes in downpayment requirements on the propensity to own. In contrast, the approach used in this study is intended to model the effects of a downpayment assistance program by simulating the impact of cash grants to

households on their propensity to own. This approach will shed more light on the potential for downpayment assistance of different amounts to stimulate homeownership.

The next section presents a brief review of the literature on this topic. Section 3 describes the data used in this study and presents the methodology for modeling the transition to homeownership. Section 4 presents the modeling results while Section 5 uses these results to simulate the impact of downpayment assistance programs on the propensity of households to become homeowners. The paper concludes with a summary of findings and policy implications from the research.

2. Literature Review

Over the last 15 years, a series of articles have evaluated the relative importance of various barriers to homeownership and the potential increases in homeownership that might result from relaxing these constraints. Among the earliest of these studies are Linneman and Wachter (1989) and Zorn (1989). Using the 1977 Survey of Consumer Credit and the 1983 Survey of Consumer Finance, Linneman and Wachter first estimate a desired home value for each household based on the choices of homeowners deemed to be unconstrained by financial considerations.[1] Next, they calculate the home value that each household could afford to purchase by applying traditional underwriting criteria to the households' income and wealth. Specifically, they assume that housing payments cannot exceed 28 percent of income and that sufficient wealth should be available to support a downpayment of 20 percent of the house value. The desired house value is then compared to the house values that are feasible given the individual's income level and, separately, their wealth level. If the ideal house value is more than 10 percent above the value supported by income or wealth, the household is deemed to be highly income and/or wealth constrained. If the ideal house value exceeds the affordable house value but by less than 10 percent, the household is considered moderately income and/or wealth constrained. Dummy variables corresponding to the degree of income and wealth constraints are then incorporated into a logit model of tenure choice for recent movers (those who moved within three years of the survey date). The study then examines the impact of these financial constraint measures on the probability of homeownership. The findings indicate that income and wealth constraints are important determinants of homeownership, with binding constraints greatly lowering the overall probability of homeownership.

Zorn's approach is similar, although rather than estimating separate income and wealth constraints, he uses a single measure of the difference between the desired house value and the value derived from

[1] A two-step process identifies unconstrained households. First, for each household two estimates are made for the house value that they could possibly afford: one assuming they are constrained by their income level and another assuming they are constrained by their wealth level. For the income constraint, the maximum affordable house value is derived by assuming that the household can only spend 28 percent of income on a mortgage covering 80 percent of the house value at an assumed market interest rate. For the wealth constraint, it is assumed that the household can afford a house that is five times its wealth (that is, wealth is used to provide a 20 percent downpayment). Unconstrained households are those whose observed house value is 85 percent or less of both of these maximum house values. In the second step, a model is estimated to predict the chosen house values of these unconstrained households based on household characteristics. This model is then applied to all households to estimate the ideal house value for each household.

the more binding of the two constraints. Based on analysis of a sample of households from 1986, Zorn's findings are consistent with those of Linneman and Wachter that moving to homeownership is less likely when financial constraints are binding.

Using data from the National Longitudinal Study of Youth from 1985 through 1990, Haurin, Hendershott and Wachter (1997) employ a similar methodology as Linneman and Wachter, but improve upon their specification in a number of ways, including creating instrumental variables for wealth and allowing for households to choose a loan-to-value ratio higher than 80 percent to avoid this constraint if their income will support larger mortgage payments. However, similar to Zorn, they combine income and wealth constraints into a single variable measuring the financial constraint imposed by standard underwriting guidelines, so the results do not shed light on the relative importance of income and wealth constraints. Their results are also highly consistent with the findings from Linneman and Wachter that these financial constraints are important factors in predicting the probability of homeownership.

While these studies made an important contribution to the literature by examining the role of financial constraints on tenure choice, none of these studies examine the magnitude of the impact of these constraints on homeownership rates. However, several recent studies have adapted this general approach to examine how a reduction in financial and other constraints might contribute to homeownership levels. Using the 1995 American Housing Survey (AHS), Quercia et al. (2003) employ Linneman and Wachter's approach to identify households who are wealth or income constrained and then incorporate these measures into a general tenure choice model. As in Linneman and Wachter, dummy variables are used to identify households facing income or wealth constraints assuming a loan requiring a 20 percent downpayment and a 28 percent front-end ratio at then-current market interest rates of 8 percent. These variables are then included in a logit model that predicts the probability of homeownership based on household characteristics (age, race-ethnicity, gender, and marital status) and the relative cost of owning and renting in each household's market area. One of the principal goals of this analysis is to examine the impact of loosening these constraints on the probability of homeownership for key subgroups of the population. The impact of loosened underwriting criteria is simulated by applying the estimated coefficients of the logit model to household characteristics and by varying the value of the dummy variables for the income and wealth constraints to reflect different underwriting assumptions regarding the maximum percent of income that is needed for housing costs, the size of the downpayment required as a percent of the house value, and the mortgage interest rate.

Quercia et al. present results for all households, as well as blacks, low- and moderate-income households, central city residents, and young households (age 24 to 29). They examine the potential impact of hypothetical mortgage products with varying loan to value ratios, front-end ratios, and mortgage interest rates. They find that the largest impacts on predicted homeownership rates are from reductions in the amount of downpayment required. Specifically, they find that relaxing downpayment requirements to between 3 and 5 percent of the house value is associated with a rise in homeownership rates of between 3 and 6 percentage points across the subgroups examined. The largest impact is associated with a loan product allowing for 0 percent down—essentially eliminating the downpayment constraint. Under this scenario homeownership rates are estimated to rise by between 7 and 9 percentage points. Quercia et al. also estimate that the increase in homeownership

rates of loosening underwriting requirements would generally be larger for blacks, low- and moderate-income households, and young households compared to all households.

One limitation of the use of the AHS for the purpose of evaluating the impact of wealth constraints on homeownership is that the AHS does not include very good information on household wealth. As a result, Quercia et al. are forced to construct wealth estimates based on estimates of housing equity and by applying a capitalization rate to income from sources other than wages. One concern of this approach is that homeowners will accumulate wealth in the form of housing equity. In this regard, Barakova et al. (2003) improve upon the analysis by Quercia et al. by using the Survey of Consumer Finances, which includes detailed information on household assets and liabilities. These authors further improve upon previous research by including estimates of credit constraints in addition to income and wealth constraints.

Barakova et al. analyze the tenure choice of recent movers between age 21 and 50. Reflecting more recent underwriting standards, households are deemed to be wealth constrained if they could not afford to fund a 10 percent downpayment for their ideal house value and to be income constrained if 38 percent of its income is not sufficient to meet the costs of a mortgage for 90 percent of the ideal home value. Using data from the 1989, 1995 and 1998 Surveys of Consumer Finances, they are also able to simulate a credit score for each household using a model estimated on proprietary credit scores from a national consumer credit reporting agency. Credit constrained households are those estimated to have a credit score of 620 or lower. They find that income constraints were only marginally important over the period studied, while wealth and credit constraints were consistently significant factors in limiting homeownership. Interestingly, this study finds that the wealth constraint was much more important than credit constraints in limiting homeownership. In 1989, twice as many recent mover households were predicted to own if the wealth constraint were removed – 60 percent of recent movers are predicted to own in the absence of wealth constraints compared to 30 percent predicted by the baseline model with wealth constrained. In comparison, removing the credit constraint only increased the baseline homeownership rate by 2 percentage points. However, over time the impact of the wealth constraint was found to decline. By 1998, removing the wealth constraint was found to increase the homeownership rate among movers by only 19 percentage points compared to 30 percentage points in 1989. The 1998 impact of the credit constraint was about the same as in 1989 – removal of this constraint was associated with an increase in the predicted homeownership rate of 3 percentage points.[2]

In short, the literature has consistently found that wealth constraints are a significant factor in limiting homeownership. Recent analysis by Barakova et al. suggests that wealth constraints may have eased between the late 1980s and the late 1990s, perhaps due to the availability of more generous underwriting from affordable mortgage products. But they also found that despite this improvement wealth constraints remain the most important financial constraint on homeownership.

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[2] Another recent study that focuses on the role of credit constraints on homeownership attainment is Rosenthal (2002). Using data from the 1998 Survey of Consumer Finances, Rosenthal identifies credit constrained households using survey questions that identify whether at any time in the past five years the household had a loan request denied, had a loan request only partially granted, or considered applying for credit but then chose not to because of an expectation of being rejected. However, he does not include any direct measures of wealth as this is expected to be an aspect of the presence of borrowing constraints.

However, there are several reasons why the existing literature does not shed much light on the question of how effective different levels of downpayment assistance would be in fostering homeownership. First of all, almost all of the work in this area employs the methodology developed by Linneman and Wachter (1989) that identifies households without sufficient current wealth to meet mortgage underwriting requirements. While this approach may be appropriate for evaluating the impact of loosening underwriting guidelines on homeownership propensities, it is not appropriate for evaluating the potential impact of cash grants of different amounts as generally provided by downpayment assistance programs as these cash grants may also ease constraints due to outstanding debts or a lack of cash for closing costs.

Another shortcoming of most of the existing literature is that these studies generally rely on a cross-sectional analysis of the tenure choice of households at a particular point in time, including both owner and renter households.[3] There is reason to believe that this approach could overstate the importance of wealth in achieving homeownership. Almost by definition, a large majority of owners will have some amount of wealth both because these households have managed to meet underwriting guidelines for a downpayment and cash reserves and also because nominal appreciation in house values will add to their wealth over time. Given the correlation between wealth and homeownership, these models may overstate the amount of wealth that is a prerequisite for achieving homeownership. In fact, a variety of research has found that renters can accumulate wealth rapidly through savings efforts or from gifts. In an analysis of renters tracked by the NLSY over a six-year period from 1985 to 1990, Haurin et al. (1996) found that the level of savings among renter households rises rapidly in the year before and the year of home purchase. In addition, based on survey data collected by the Chicago Title & Trust Company, Mayer and Engelhardt (1996) examine the source of funds used for downpayments and find that about one in five first time buyers from 1988 and 1993 received gifts to help fund home purchase, with the gifts on average accounting for about half of the downpayment. Listokin et al. (2002) also find that among renters in the 1993 SIPP panel who purchased a home by the end of the panel in 1995, 93 percent purchased homes that had values that exceeded the amount that appeared to be affordable to those households in 1993. Furthermore, a large majority of these households purchased housing that was valued at least 50 percent higher than the estimate of what they could afford. In short, there is good reason to believe that the wealth constraint may not be as binding on renters as a cross-sectional assessment of tenure choice would make it appear.

This study is intended to improve upon existing research in several ways. First, it will evaluate the potential of downpayment assistance programs to stimulate homeownership by measuring the impact of cash grants on the propensity to own. Second, it will avoid the endogeneity of wealth and homeownership by focusing exclusively on a sample of renter households. Finally, by tracking renter households over time it will capture the ability of households to accumulate savings, reduce expenses, and/or increase income to achieve homeownership, dynamic aspects of the tenure transition process that are not captured by cross-sectional analysis.

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[3] An exception is Galster et al. (1999) who model the probability that renter households in the 1990 SIPP panel will become homeowners by the end of that panel 18 months later. However, this study does not evaluate the impact of wealth constraints on the probability of homeownership, but instead focuses on the combined importance of discrimination, informational barriers, and housing market conditions on homeownership propensities of households other than white suburbanites.

3. Data and Methodology

Data Source

The 1996 Panel of the Survey of Income and Program Participation (SIPP) is the source of data used for this study.[4] The SIPP is a nationally representative, longitudinal survey of households that gathers detailed information about their income and wealth as well as other household characteristics. The longitudinal nature of the SIPP provides researchers with an opportunity to observe dynamic aspects of household circumstances over several years. The 1996 panel tracked a sample of some 37,000 households over a four-year period between December 1995 and February 2000. As with earlier SIPP panels, the 1996 panel over sampled the low-income population to ensure a large sample of households who are eligible for government assistance.

Each household is surveyed every four months (or three times per year) over the life of the panel, with each interview referred to as a 'wave' of the survey. The 1996 SIPP panel includes 12 waves. In each wave, a core set of information concerning household composition, labor force participation, income, and participation in government programs is collected. Each wave also includes a topical module that asks detailed questions about a rotating set of topics, such as marital history, education and training, child care, disabilities, medical expenses, utilization of health care, etc. Of particular interest for this study, the 1996 SIPP included detailed questions about household assets and liabilities once each year – during the third, sixth, ninth, and twelfth waves.

The 1996 SIPP is particularly well suited for investigating the potential for downpayment assistance to increase homeownership. First, by tracking a panel of households over time, it captures the dynamic nature of household financial circumstances that is an important part of the process of transitioning from renting to owning. Second, the time period covered is also of interest as the late 1990s was a time when more liberal mortgage products were becoming more widely available. Third, it provides detailed information on household assets and liabilities on an annual basis. Finally, it has a sufficiently large sample size to provide reliable estimates of the experience of low-income and minority renter households.

However, it is important to note that there are questions about the accuracy of the SIPP's estimates of wealth. A recent review by Czajka et al. (2004) has shown that the SIPP provides consistently lower estimates of wealth than either the Survey of Consumer Finances (SCF) or the Panel Study of Income Dynamics (PSID), two other national surveys that gather detailed information on household wealth. Specifically, they find that the SIPP's estimate of median net wealth is only two-thirds of the median derived from the SCF and 74 percent of the PSID median. However, they attribute the majority (72 percent) of the underreporting of wealth in the SIPP to underestimates of the assets of wealthy households. Of the remaining underreporting, they attribute 13 percent to assets not captured by the SIPP, including pension plans other than 401(k) and thrift accounts, the cash value of life insurance, annuities and trusts, and vehicles owned beyond the three captured by the SIPP. Again, much of this missing wealth is concentrated among the wealthy. However, there is also underreporting of business

[4] See U.S. Department of Commerce (2001) for a detailed description of the SIPP.

equity among the non-wealthy, which accounts for 5 percent of the lower wealth estimates in the SIPP. Other than business equity, underreporting of other assets by the nonwealthy accounts for 10 percent of the shortfall in wealth captured by the SIPP. Perhaps more importantly, Czajka et al. report that SIPP families underreport ownership of checking and savings accounts and IRAs and Keogh accounts.

Nonetheless, Czajka et al. note that the SIPP provides much larger sample sizes for low-income households than the apparently more reliable SCF. And for this population, when the assets not captured by the SIPP are excluded from the SCF estimates, the two surveys provide fairly comparable estimates of wealth. Thus, while there are concerns about underreporting of wealth in the SIPP, these concerns are less for the low-income population, who are the focus of this study, than for the wealthy.

The sample used for this study consists of all renter households from the third wave of the 1996 SIPP. This wave is the first one for which information on assets and liabilities was collected. The heads of these households are then tracked through the final wave to observe changes in their tenure status and financial circumstances.[5] Thus, the tenure choices of renter households from wave 3 are observed for up to 9 periods, corresponding to waves 4 through 12. The time period covered by these waves is November 1996 through February 2000. Exhibit 1 provides information on this sample. The initial sample consists of 11,357 renter households. The sample includes fairly large numbers of low-income and minority households.[6] Of the renter sample, 8,438 are low-income, 2,065 are black, and 1,493 are Hispanic.[7] Exhibit 1 also shows the transition rates to homeownership of the overall sample and key subgroups. Of the total sample of 11,357 renters, 2,062, or 18.2 percent, become homeowners by wave 12. The key subgroups of interest for this study have a lower rate of transition, with 13.7 percent of low-income households, 10.5 percent of black households, and 13.6 percent of Hispanic households becoming owners over the period.

Finally, Exhibit 1 also shows the rate of censoring over the period from wave 3 through wave 12. A household is considered censored if it is dropped from the survey prior to wave 12 and before it is observed to have become a homeowner. There is a fairly high rate of censoring among the sample, with 27 percent of the initial sample of renter households becoming censored before wave 12. The censoring rates are slightly higher for the subgroups of interest, with 28 percent of low-income

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5 The head continues to be tracked even if they join another household as a non-head (e.g., move in with their parents). Thus, the tracked individuals can have three tenure statuses over time – renter, owner, or non-head. The SIPP follows all members of the originally sampled households, but we do not track non-heads from the original sample who split off either to form their own household or to join another household.

6 "Low income" households are those with income of 80 percent or less of area median income. Area median income is based on estimates by the U.S. Department of Housing and Urban Development (HUD) for each federal fiscal year for metropolitan areas, non-metropolitan counties, and metropolitan and non-metropolitan portions of states. (See http://www.huduser.org/datasets/il.html for detailed information on these estimates.) HUD's estimates are linked to the SIPP using information in the SIPP on the metropolitan area, state, and metro status of each observation.

7 Throughout this study, the terms whites and blacks are used to refer to non-Hispanic households in these racial groups, while Hispanics may be of any race.

households, 32 percent of black households, and 31 percent of Hispanic households becoming censored.

Exhibit 1
Sample Sizes, Tenure Transition and Censoring

	Wave 3 Renter Households	Households Becoming Owners By Wave 12	Share Becoming Owners	Households Censored* by Wave 12	Share Censored
All Households	11,357	2,062	18.2%	3,089	27.2%
Household Income**					
Low	8,438	1,160	13.7%	2,432	28.8%
Low-Moderate	1,088	275	25.3%	267	24.5%
Upper-Moderate	650	216	33.2%	139	21.4%
High	1,181	411	34.8%	251	21.3%
Race/Ethnicity***					
White	7,268	1,550	21.3%	1,817	25.0%
Black	2,065	216	10.5%	654	31.7%
Hispanic	1,493	203	13.6%	461	30.9%
Other	531	93	17.5%	157	29.6%

Notes:

* "Censored" households are those who are dropped from the survey prior to wave 12 and before a transition to homeownership is observed.

** Income categories defined as follows: "Low" is less than 80 percent of area median income; "Low Moderate" is between 80 and 100 percent of area median income; "Upper Moderate" is between 100 and 120 percent of area median income; and "High" is above 120 percent of area median income.

*** The categories White, Black and Other exclude households of Hispanic origin, while Hispanics may be of any race.

Source: Authors' tabulations of 1996 SIPP Panel, Waves 3 through 12.

Methodology

The analysis has two stages. In the first stage, a parametric proportional hazard model is estimated of the transition to homeownership.[8] In the second stage, the results of the hazard model are used to simulate the impact of cash grants to households on the probability of becoming a homeowner over time.

[8] A parametric model is used rather than the more flexible approach of a semi-parametric model such as the Cox proportional model because parametric models can more readily be used to simulate the probability of transition to homeownership. See Kalbfleisch and Prentice (2002) for a detailed discussion of approaches for estimating of hazard models.

In modeling the transition to homeownership, we have assumed that the baseline risk of becoming a homeowner can be described by a Weibull distribution.[9] Using maximum likelihood techniques, the following equation is estimated:

$$h(t \mid x_{jt}) = pt^{p-1} \exp(B_0 + x_{jt}\beta_x)$$

where $h(t|x_{jt})$ is the hazard that subject j will become a homeowner at time t given subject j's characteristics at time t described by the vector x. The baseline hazard is given by pt^{p-1}, with the parameter p indicating the shape of the distribution. This baseline hazard is shifted for each subject by the term $x_{jt}ß_x$, with $ß_x$ the vector of coefficients corresponding to the independent variables x. The hazard is the instantaneous rate of failure, with failure in this case defined as a change in housing tenure from renting to homeownership. The hazard indicates the number of failures that would be expected in a given interval of time, conditional upon the subject having not failed prior to the beginning of that interval, divided by the width of the interval. The hazard rate can range from 0 to infinity.

In our analysis of the SIPP data the period used is the time interval between interviews. This is generally a period of four months, although in some cases the interval is as short as two months or as long as nine months.[10] The data are organized so that a household's characteristics at the beginning of an interval are used to predict the probability of becoming a homeowner by the end of the period. Thus, wave 3 household characteristics are used to predict the probability of that household becoming a homeowner by the time of the wave 4 interview, wave 4 characteristics are used to predict tenure in wave 5, and so on. As a result, while tenure status in wave 12 is used, household characteristics as of wave 12 are never used as explanatory variables. In the estimated model, time is measured as the period in months from the wave 3 interview to capture the fact that the sampled households are at risk of becoming homeowners in our analysis from the time we begin tracking them. The analysis is designed to estimate the time until each renter household becomes a homeowner. Once homeownership is achieved, the household is dropped from the dataset.[11]

The impact of downpayment assistance on the propensity to purchase a home is simulated by increasing the amount of liquid financial assets held by each household in the sample by the amount of the hypothesized downpayment assistance. The estimated model is then used to predict the probability of moving to homeownership given this higher level of liquid financial assets. The impact of the downpayment assistance is given by the difference between the predicted average cumulative homeownership attainment rate with and without the downpayment assistance. The simulations are run for all renter households as well as for sub-groups of low-income, black, and Hispanic households.

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[9] Other functional forms were investigated in developing the model. The Weibull model was found to provide the best fit of the data.

[10] Intervals of more than four months are possible as households may miss a wave of interviews and not be dropped from the survey, but households missing more than one wave are no longer tracked.

[11] It should be noted that we are not modeling time until *first* homeownership, as we do not know whether the subjects previously owned a home. Rather we are modeling the time until next homeownership, which for many households may be their first experience with homeownership.

Explanatory Variables

The explanatory variables used in the model are intended to capture the household demographic characteristics, income, wealth, and market conditions associated with the desire and ability to purchase a home. Exhibit 2 presents summary statistics for the independent variables.
The specific variables included and their expected associations with the probability of becoming an owner are discussed in turn below.

Demographic Characteristics

Race/Ethnicity

The race/ethnicity of the household head is included in the model to account for racial/ethnic differences in the propensity to become a homeowner. The SIPP includes four categories of race (white; black; American Indian, Aleut, or Eskimo; and Asian or Pacific Islander) and over 30 country of origin categories. Combining these two SIPP variables, we created indicator variables for the mutual exclusive groups of white, black, Hispanic, and Other (which includes the categories American Indian, Aleut or Eskimo and Asian or Pacific Islander).[12] Household heads that indicated an origin of Mexican, Mexican-American, Chicano, Puerto Rican, Cuban, Central American, South American, Dominican Republican, or Other Hispanic are categorized as "Hispanic," regardless of the racial category indicated. An extensive literature has found that blacks and Hispanics are less likely than whites, all else equal, to become homeowners (Haurin et al. (2004)). As a result, it is expected that these households will have a lower probability of becoming homeowners.

Age

The age of the household head in years is included as an explanatory variable to capture the strong association between age and the likelihood of becoming a homeowner. Homeownership rates rise rapidly as households age through their 20s and into their 30s. Homeownership rates continue to rise, although at a slower rate well into old age, before declining slightly. Reflecting this general tendency we would expect a positive coefficient on the age variable initially to reflect the growing rate of transition into homeownership, followed by a negative coefficient as the probability of moving into homeownership declines for older households. We attempted specifications with age and its square to capture this non-linear relationship, but found that in these specifications age squared was significant but age was not. As a result, we felt that a model including age without its square was more appropriate.

[12] The "other" race category is not a focus of analysis due both to the relatively small sample size and the diverse nature of this grouping.

Exhibit 2 Summary Statistics

	Mean	Median	Standard Deviation	Minimum	Maximum
Demographic Variables					
Race/Ethnicity:					
White	0.63	1.00	0.48	0	1
Black	0.19	0.00	0.39	0	1
Hispanic	0.13	0.00	0.34	0	1
Other	0.05	0.00	0.21	0	1
Age	44.4	40.0	17.3	15	87
Marital Status:					
Married	0.33	0.00	0.47	0	1
Divorced	0.39	0.00	0.49	0	1
Single	0.29	0.00	0.45	0	1
Presence of Children	0.41	0.00	0.49	0	1
Education Level:					
Less than High School	0.26	0.00	0.44	0	1
High School	0.29	0.00	0.45	0	1
Some College	0.27	0.00	0.45	0	1
College	0.18	0.00	0.39	0	1
Economic Variables					
Household Income (000s)	30.3	23.0	30.1	-23.7	795.9
Log of Household Income	9.8	10.0	1.6	0.0	13.6
Interest Rate (Percent)	7.40	7.46	0.33	6.86	7.94
Interest Rate Change	-0.02	-0.05	0.26	-1.03	1.11
Area Median House Value (000s)	121.0	109.9	42.2	47.7	329.5
Area Annual House Price Appreciation	0.04	0.04	0.03	-0.09	0.15
Area Ratio of Gross Rent to Owner Costs	0.54	0.54	0.05	0.44	0.71
Area Ratio of Gross Rent to Median House Value	0.09	0.09	0.02	0.04	0.17
Financial Asset Variables					
Liquid Financial Assets	14,590	232	346,534	-478,000	50,100,000
Share with Non-Zero Liquid Financial Assets	0.62	1	0.49	0	1
Net Business Equity	3,146	0	53,797	-400,000	3,700,000
Share with Non-Zero Net Business Equity	0.06	0.00	0.24	0.00	1.00
Net Real Estate Equity	2,332	0	25,182	-36,000	1,860,000
Share with Non-Zero Net Real Estate Equity	0.03	0.00	0.18	0.00	1.00
Net Vehicle Equity	3,113	1,000	5,429	-33,930	63,900
Share with Non-Zero Net Vehicle Equity	0.71	1.00	0.18	0.00	1.00
Unsecured Debt	4,417	0	17,831	0	1,212,100
Share with non-zero unsecured debt	1.00	1.00	0.02	0.00	1.00

Source: Authors' tabulations of 1996 SIPP Panel, Waves 3 through 11.

Marital Status

Homeownership rates are generally highest for married households. Mutually exclusive indicator variables are created to identify households that are headed by married couples (used as the reference group in the estimated model), previously married (i.e., divorced, separated or widowed), and single. The expectation is that those who are married will have a higher likelihood of transitioning to homeownership compared with those who are single or divorced.

Presence of Children

Households with children tend to have higher homeownership rates, perhaps reflecting greater demand for housing services or greater desire for residential stability. To capture this effect, an indicator variable will be included to identify households with children under age 18. This variable is expected to be positively associated with the probability of becoming a homeowner.

Education Level

Dummy variables are also used to measure the highest education level attained by the household head. A more detailed SIPP education variable is collapsed into four categories: less than a high school graduate, a high school graduate, some college, and a college graduate or more (which is used as the reference category in the estimated model). Households with heads who have higher levels of education are expected to have higher long-run income and asset levels, and therefore a higher likelihood of becoming homeowners.

Household Income

Household income has a strong association with the likelihood of becoming a homeowner. The income measure used is the total household annual income for the current wave. This includes earned income, property income, means-tested cash transfers, and "other" household income. The total household income for each wave is multiplied by three to estimate the annual income for that household as of that wave. Since the impact of higher levels of income on the probability of homeownership would expect to diminish at higher levels of income, income will be measured as the log of income.[13]

Financial Assets and Liabilities

Waves 3, 6 and 9 of the SIPP topical modules include a series of detailed questions on household financial assets and liabilities.[14] One of the shortcomings of the SIPP for estimating the impact of household financial net wealth on the probability of becoming a homeowner is that the questions on financial assets and liabilities are only collected once a year, while all other information on the household is available every four months. One option would be to estimate a hazard model based solely on these once annual observations on the sampled households. However, this approach would not take advantage of the additional information on changes in household and market circumstances and tenure choice that is available from the two intervening waves of sample data from each year. Another option is to include all waves in the model, but employ some assumption about the level of

[13] Negative and zero income are recoded as 1 so that the log of income is defined as 0.

[14] The financial asset and liability questions are also gathered in the 12th wave, but since we do not observe the household's tenure subsequent to wave 12, this information is not used in the model.

financial assets and liabilities in the waves for which this information is not collected. One approach considered was to interpolate values for these variables between the 3rd, 6th and 9th waves. However, due to censoring, we do not always observe households in these subsequent waves, so this approach could not be consistently applied to all households. In the end, in order to preserve as much information on the timing of tenure transitions as possible, we chose to include all waves in the model with the value of the financial asset variables taken from the most recent wave available.[15] Thus, wave 3 wealth measures are also used in waves 4 and 5, wave 6 wealth measures are also used in waves 7 and 8, and wave 9 wealth measures are also used in waves 10 and 11.[16]

In order to evaluate whether the impact of financial assets may vary by type of asset, separate measures were created for liquid financial assets, which are most commonly tapped to purchase a home, and other asset classes. Each of the asset classes and the measures used to capture them are discussed in turn below.

Liquid Financial Assets

The components of the liquid financial assets variable include:

- Equity owned in other financial investments;
- Face value of U.S. savings bonds;
- Amount in joint, non-interest earning checking account;
- Amount in individual, non-interest earning checking account;
- Interest earning assets held in banking institutions;
- Interest earning assets held at other institutions;
- Equity in stocks and mutual fund shares; and
- Equity in IRA and KEOGH accounts.[17]

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[15] It is not clear how this lag in the availability of information on financial assets would affect the estimated coefficients for these variables. On the one hand, household wealth is known to increase rapidly in the period immediately prior to purchasing a home (Haurin et al. (1996)). In this case it might be expected that small amounts of savings would be estimated to have a large impact on the probability of owning as the savings level of future buyers represents only a portion of the amount ultimately accumulated prior to purchase. Thus, for example, every $1,000 saved may be representative of some larger amount of money ultimately saved before purchase. On the other hand, the lag between the collection of information on assets and liabilities and switches in tenure may weaken the association between wealth levels and this decision.

[16] As described above, the survival model uses information from wave 3 to predict tenure choice in wave 4, information from wave 4 to predict tenure choice in wave 5, and so on. Since we don't observe tenure choice after wave 12, information on wealth collected in this wave is not used in the analysis.

[17] IRA and KEOUGH accounts are less liquid than other forms of savings due to the limitations on the ability to withdraw these funds. However, owners of these assets can nonetheless tap them, either by paying penalties and taxes or by borrowing against these funds.

These liquid financial assets are expected to be the primary source of wealth used to fund home purchase. While the financial asset variable itself is continuous, splines are used to account for the possibility that different ranges of financial assets may have different effects on the probability of home purchase.[18] The knots used for the splines are at $1, $1,000, $5,000, and $20,000; this means that slope coefficients are estimated separately for the ranges of liquid financial assets of less than $1, from $1 to $999, from $1,000 to $4,999, from $5,000 to $19,999, and $20,000 or greater.[19] Our expectation is that lower levels of wealth will have a greater impact on the probability of buying a home, with less marginal impact from the highest wealth categories.

Vehicle Wealth

Vehicle wealth is comprised of the total value of all vehicles owned minus the debt on these vehicles. Since it seems unlikely that households would tap vehicle wealth (at least for primary vehicles) to purchase a home, this subcategory of wealth was separated from financial assets. Various forms of this variable were tried, including a continuous variable and splines. However, these approaches produced generally insignificant coefficients. In the final specification, a series of categorical dummy variables were used to indicate households with negative vehicle wealth, zero vehicle wealth, low levels of vehicle wealth (less than $20,000), and high levels of vehicle wealth ($20,000 or more). While lower levels of vehicle wealth are not expected to be used for homeownership given the household's need for transportation, it would be expected that higher levels of vehicle wealth would have a positive association as this excess wealth could be channeled into buying a home while leaving sufficient wealth for vehicle ownership.

Real Estate Wealth

The SIPP also collects information on the value of real estate owned other than primary residences and the debts associated with these properties. The SIPP asks separate questions about owner-occupied properties, but since our sample includes only renter households, there are no owner-occupied properties. Ownership of real estate would be expected to be positively associated with the transition to homeownership both because of the potential ability to tap this wealth to finance a home purchase and because the household has been shown to be willing to take on the risk associated with investments in real property. However, this form of wealth may be fairly illiquid and so may be less likely to be tapped to purchase a home. Various specifications were tried to capture the impact of real estate wealth on the probability of becoming a homeowner, including a continuous variable, splines, and categorical dummy variables. Most of these specifications were insignificant, perhaps due to the relative rare occurrence (3 percent) of the ownership of real estate. A dummy variable, indicating presence of positive other real estate wealth is included in the model.

Business Equity

Business wealth, like real estate wealth, may provide a source of funds for purchasing a home, but the illiquid nature of these funds may also mean they are less likely to be used to fund a home purchase. In addition, households owning a business may choose to invest available funds in the business rather than in home purchase. As with ownership of other real estate, very few people in the sample had business equity. Variations of business equity measures were tried in the model, including a

[18] See Greene (2003) for a discussion of the use of spline functions in regression analysis.

[19] The knots were chosen based on a comparison of results from alternative locations for the knots. The chosen knots were found to provide higher levels of statistical significance on the estimated coefficients.

continuous variable with splines and dummy variables indicating the presence of positive or negative business wealth, but as none of the coefficients of alternative specifications proved statistically significant, they were dropped from the final model.

Unsecured Debt

The final category of assets and liabilities included in the model is unsecured debt. Unsecured debt includes debts on credit cards, for medical expenses, personal loans, and student loans. It would be expected that higher levels of unsecured debt would lower the likelihood of purchasing a home by making it more difficult for the household to meet mortgage underwriting requirements concerning debt to income ratios. However, it is also likely that those who purchase homes will have some amount of unsecured debt. Unsecured debt is included in the model in spline form, with knots at $2,000, $5,000 and $10,000.

Market Characteristics

Mortgage Interest Rate

Interest rates for the relevant time period are taken from the Monthly Interest Rate Survey of the Federal Housing Finance Board.[20] The effective interest rate (including points and fees) for a 30-year, fixed-rate mortgage is used to measure fluctuations in interest rates over time. At the beginning of the four-year period of this SIPP panel, the effective interest rate was 7.8 percent, having fluctuated between 7.2 and 8.2 percent over the previous 2 years. The rate then dropped fairly steadily through late 1998 to about 6.8 percent, before rising again fairly steadily to about 8 percent by the beginning of 2000. In short, the study period was one of relatively favorable interest rates. It is expected that lower interest rates would make homeownership more affordable so that there would be a negative association between interest rate levels and the probability of becoming a homeowner. Another possibility is that the move to homeownership may be more closely related with short run fluctuations in interest rates than in the level of interest rates. That is, households may time their home purchase to take advantage of short run declines in interest rates even if the overall level of interest rates is higher than in previous years. Again, declines in interest rates would be expected to be associated with higher rates of homeownership, so the coefficient on this variable should be negative.

To test these different potential impacts of interest rates, three alternative measures were included in the estimated model – the interest rate level at the beginning of the period of observation, the interest rate at the end of the period, and the change in the interest rate during the period. In survival modeling, explanatory variables are generally from the beginning of the period of observation while the outcome is from the end of the period of observation. For example, if the household is observed first in January of a given year, and then again four months later in May, the household and market characteristics in January would be used to predict the outcome observed in May. However, since interest rates do not remain stable during the four month period, and fluctuations in interest rates are hypothesized to be an important factor in the specific timing of a home purchase decision, we experimented with these different measures of interest rates to capture the hypothesized role of changing interest rates on the timing of the purchase decision. The interest rate levels from both the beginning and end of the period were found to have a positive association with the transition to

[20] See the Federal Housing Finance web site for a description of these data: http://www.fhfb.gov/MIRS/MIRS.htm.

homeownership – a result that was not consistent with our expectation – while the change in interest rate had the expected negative association. As a result, the interest rate change was used in the final versions of the model.

Median House Value

The ability of households to afford to purchase a home will vary with the level of housing prices across markets. Higher house prices would be expected to lower the propensity to purchase a home. To capture this factor, the median home value in the market area where the household lived was included as an explanatory variable. The median value is derived from the 2000 decennial census, but is indexed over time using the house price index from the Office of Federal Housing Enterprise Oversight (OFHEO).[21] The SIPP identifies the specific metropolitan area where the household resides for some 98 metropolitan areas as well as the state of residence. In cases where the metropolitan area is identified, data for this area is used. In other cases, we use estimates of the median value for the state.[22]

Annual House Price Appreciation Rate

In addition to the level of house prices, the decision to purchase a home may be related to trends in house price appreciation. In general, it would be expected that higher levels of appreciation would provide a greater incentive to purchase a home since the rate of return on the investment is high. In addition, buyers may be motivated to purchase sooner than they might otherwise out of concern that it may become more difficult to buy if prices continue to rise. On the other hand, rapidly rising home prices may also make it more difficult for renters to purchase a home. In short, the impact of rising home prices on the propensity to purchase is indeterminate. If the coefficient is positive, this indicates that the increased return to homeownership is motivating individuals to purchase sooner. If the coefficient is negative, it indicates that rising home prices are making attainment of homeownership more difficult for renters. Under the assumption that households derive assumptions about future house price appreciation from recent trends, we measure house price appreciation as the percent change in the OFHEO house price index for the relevant market area over the year prior to the interview date.

Ratio of Renter and Owner Costs

A common factor that is included in tenure choice models is some relative measure of the cost of renting and owning. A higher cost of renting relative to owning would be expected to increase the propensity to own. Two approaches were explored to capture the relative cost of renting and owning, both using data from the 2000 decennial census. The first measure was the ratio of median gross rent on an annual basis to the median home value. The second was the ratio of median monthly gross rent to the median monthly owner-occupied housing cost. This latter measure has the advantage of factoring in differences in property tax and insurance rates across markets, but also has the drawback of having owner costs determined in part by the average amount of equity owners have in their homes

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[21] For information on the derivation of this price index, see OFHEO's web site: http://www.ofheo.gov/HPI.asp.

[22] Due to the small sample size in some areas, the SIPP combines the states of Maine and Vermont into one state grouping and the states of North Dakota, South Dakota, and Wyoming into another grouping. In these cases, we created a weighted average of the median house values for the individual states using the number of owner-occupied housing units as the weights.

and variations in interest rates over time. In practice, we found that the ratio of gross monthly rent to the median house value was generally insignificant, in part due to a strong correlation with the median house value, which was highly significant. As a result, the ratio of median rent to median owner costs was used in the final model.

4. Modeling Results

Exhibit 3 presents modeling results. Overall, the model fits the data well as indicated by the chi-square statistic for the likelihood ratio. The Weibull distribution shape parameter *p* is 1.37 and highly significant. A *p* value slightly above one indicates that the baseline risk of becoming a homeowner rises gradually over time. Given the importance to this study of the subgroups consisting of blacks, Hispanics, and low-income households, stratified models were also estimated that allowed the baseline hazard to vary across these groups. These tests found that the baseline hazard does not vary for blacks or low-income households, although it did for Hispanic households. However, it was found that a model that allowed the baseline hazard to vary for Hispanics did a much poorer job of predicting the actual rate of homeownership among the Hispanic sample. As a result, the estimated model did not include a different baseline hazard for Hispanics.[23]

Both the estimated hazard ratio and coefficients are shown. The hazard ratio is the ratio of the hazard rate with a one-unit change in the variable of interest to the hazard rate before this one unit change. Hazard ratios of less than one indicate that increases in the variable lower the hazard rate, while hazard ratios greater than one indicate that an increase in the variable raises the hazard rate. For example, the hazard ratio of 0.7436 on the black dummy variable indicates that the probability that a black household will become a homeowner is 74.36 percent of the probability that a white household will become an owner, all else equal. (In the case of a dummy variable a one-unit change in the variable is equivalent to comparing the hazard rate for the dummy category to the base case category.) Since the sample includes multiple observations for individual households over time, there is a possibility of correlation across these observations. To allow for this, robust standard errors are estimated accounting for the correlation of outcomes across individuals.[24]

In general, the independent variables are highly significant and of the expected sign. Among the demographic characteristics, blacks and Hispanics are found to have a lower propensity to become owners, all else equal. Relative to households headed by married couples, both divorced and single person households are much less likely to purchase a home. The presence of children in the household also increases the likelihood of purchasing a home. Higher levels of education are

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[23] The models do, however, include dummy variables for blacks and Hispanics. The dummy variables will shift the baseline hazard, but will not alter its shape.

[24] A further test of the correlation of outcomes for an individual is to allow for shared frailty, which is the survival-data equivalent of a random-effects model. The Stata® software package provides tests for evidence of shared frailty in the data. The results suggested that shared frailty was evident, but only when a Weibull distribution was assumed. For other forms for the baseline hazard, shared frailty was not evident. Comparison of results using a Weibull model with and without shared frailty showed that the model without shared frailty did a better job of recreating the actual rates of homeownership attainment. As a result, the preferred model did not incorporate estimates for shared frailty.

Exhibit 3
Modeling Results

Variable	Hazard Ratio	Coefficient	Standard Error	Z Score
Demographic Variables				
Race/Ethnicity:				
Black	0.7436	-0.2190	0.056	-3.91
Hispanic	0.8542	-0.1331	0.067	-1.98
Age	0.9785	-0.0212	0.002	-11.11
Marital Status				
Divorced	0.7498	-0.2135	0.044	-4.89
Single	0.4230	-0.3637	0.029	-12.72
Presence of Children	1.1115	0.1215	0.057	2.12
Education Level:				
Less than High School	0.8009	-0.1718	0.072	-2.40
High School	0.9513	-0.0398	0.063	-0.63
Some College	0.9211	-0.0722	0.057	-1.26
Economic Variables				
Log of Household Income	1.3475	0.3989	0.048	8.31
Interest Rate Difference	0.6950	-0.2535	0.060	-4.24
Median House Price	0.9970	-0.0031	0.001	-4.24
House Price Appreciation	0.0025	-0.0155	0.003	-5.40
Ratio of Renter to Owner Costs	11.2656	27.0370	6.627	4.08
Financial Assets Variables				
Liquid Financial Assets $0 or less	1.0451	0.0453	0.076	0.60
Liquid Financial Assets $1 to $999	1.4054	0.4682	0.110	4.25
Liquid Financial Assets $1,000 or $4,999	1.0495	0.0513	0.025	2.04
Liquid Financial Assets $5,000 to 19,999	1.0136	0.0138	0.006	2.19
Liquid Financial Assets $20,000 or more	0.9989	-0.0001	0.000	-0.71
Has Real Estate Wealth	1.4257	0.4918	0.129	3.82
Has Negative Vehicle Wealth	1.2899	0.3199	0.132	2.43
Has Vehicle Wealth $1 to $19,999	1.4625	0.5532	0.112	4.93
Has Vehicle Wealth $20,000 or more	1.8320	1.1085	0.263	4.22
Unsecured Debt $0 to 1,999	1.0908	0.5208	0.243	2.14
Unsecured Debt $2,000 to $4,999	0.9825	-0.2605	0.543	-0.48
Unsecured Debt $5,000 to $19,999	0.9782	-0.2522	0.219	-1.15
Unsecured Debt $20,000 or more	1.0000	0.0000	0.000	0.00
Weibull Shape Parameter p	1.3723	0.4336	0.029	15.04
Number of Observations	75,512			
Number of Subjects	11,352			
Log likelihood	-6133.0167			
Likelihood Ratio Chi-squared	1390.52			
Prob > Chi squared	0.0000			

associated with a higher probability of home purchase, although the only education categorical variable that is statistically significant is for those with less than a high school education. The coefficient on the age variable is negative, indicating that as households age they become less likely to purchase a home. As discussed above, we had expected the coefficient on age to be positive for younger age groups and negative for older age groups. Given that the baseline hazard is rising over time (as discussed above, this is evidenced by the Weibull Shape Parameter being above one), the negative coefficient of age counters this effect and produces the expected initial rising and then falling hazard rate as households age. Finally, household income is positive and highly significant.

In terms of market characteristics, the coefficient on the interest rate change is negative, indicating that when interest rates rise households are less likely to purchase. The coefficient for the median house price is also negative, indicating that borrowers are less likely to purchase in higher priced markets. The hazard ratio for the renter-to-owner cost measure is positive, indicating that if rents are high relative to owners costs, households are more likely to purchase a home. Finally, the appreciation rate in home prices is negative, indicating that rising prices decrease the probability of renters purchasing a home.

The wealth measure of most interest for this study is liquid financial assets. This variable was included in the model in a series of splines designed to allow the slope to vary for different ranges of this variable. The first and last splines are not statistically significant, indicating that there is little association between the probability of becoming a homeowner and either negative liquid wealth or levels of wealth above $20,000. The middle three splines are all statistically significant. The hazard ratio of the second spline, measuring liquid wealth between $1 and $999, is the largest in magnitude at 1.41. Since liquid wealth is measured in thousands of dollars, this hazard ratio indicates that households with $1,000 in liquid wealth are 41 percent more likely than households with no liquid wealth to purchase a home. The hazard ratio for the next spline is also greater than one, but is much smaller at 1.05. This hazard ratio indicates that for every $1,000 in liquid financial assets between $1,000 and $5,000, the probability of homeownership increases by 5 percent. Finally, the spline for liquid wealth between $5,000 and $19,999 is also positive, but is just slightly larger than one. Thus, for every $1,000 in liquid assets between $5,000 and $20,000 the probability of buying a home increases by a little more than 1 percent. The insignificance of the coefficient on wealth above $20,000 suggests that at this level of wealth, households are generally unconstrained by wealth in choosing whether to purchase a home. As a result, additional wealth above $20,000 has no impact on this decision.

These results suggest that the biggest impact on the probability of becoming a homeowner is from having some initial positive liquid assets.[25] The impact of additional liquid assets, while still positive, is much smaller. However, one concern with this result is that it may be that the most common reason for a household to begin accumulating savings is because they have decided to pursue homeownership. In that case, households who have decided to purchase a home would be identified by the accumulation of savings. That is, the presence of savings is a flag for a *desire* to be a homeowner as much as it is an indication of an *ability* to overcome a wealth barrier to

[25] A large share of the sample (39 percent) did not have any positive financial assets as of wave 3.

homeownership.[26] This situation would be problematic for the purpose of simulating the impact of downpayment assistance on the probability of becoming a homeowner as the mere availability of financial assistance would not be expected to create the desire to become a homeowner. Yet, that may be what the addition of liquid assets is in part simulating. Unfortunately, in our results we cannot distinguish these effects.

Interestingly, none of the other classes of financial wealth were found to have as strong a relationship with homeownership as liquid financial wealth. Initial estimates, which included splines for all of the other financial wealth variables, resulted in generally insignificant coefficients. As previously described, the measures of business wealth were consistently insignificant and so were dropped from the model. The magnitude of real estate wealth was also not significant, although the presence of this type of wealth (as captured by a dummy variable indicating some positive real estate wealth) was found to have a positive association with homeownership. Households with some real estate wealth were 43 percent more likely to buy than other households, all else equal. It may be that the owning of other real estate indicates individuals who are willing to take on this investment risk and familiar with real estate transactions, and so more likely to be attracted to owning their own home. Given that the level of real estate wealth was not significant, this signaling of willingness to buy property appears to be more important than the amount of wealth in other properties. Similarly, the amount of wealth in vehicles was not statistically significantly associated with the probability of homeownership, but having some non-zero vehicle wealth is significant and positively associated with homeownership. The largest association is with high levels of positive vehicle wealth and the smallest with negative vehicle wealth. It may be that the presence of vehicle wealth is an indication of an ability to accrue savings as needed. Finally, unsecured liabilities are found to have a generally weak association with homeownership. The main result is that low levels of unsecured liabilities are associated with a greater likelihood of home purchase, perhaps indicating that these households are active, but reasonable, users of credit and so represent good credit risks. Levels of unsecured debt above $2,000 begin to lower the probability of ownership, but the magnitude is small and the coefficients are not statistically significant.

Given the importance of the financial variables for this study and to shed some light on the role of liquid financial assets and wealth generally in the transition to homeownership, Exhibit 4 presents summary information on these variables at the time of wave 3 for households who subsequently purchased a home and those who were not observed to buy. There is a fairly substantial difference in the average liquid assets as of wave 3 between buyers and non-buyers, with buyers having 40 percent more liquid assets on average. However, the average masks the fact that a large share of both buyers and non-buyers have limited amounts of liquid assets. The median level of liquid assets is only $928 for buyers and $160 for non-buyers. In fact, 71 percent of buyers had less than $5,000 in liquid assets as of wave 3. The largest difference between the two groups in terms of the distribution of liquid assets is the share with no positive liquid assets, with 43 percent of non-buyers in this group compared to 23 percent of buyers. Given the generally low level of liquid financial assets among

[26] Households who are beginning to accumulate savings may also benefit from assistance from family in purchasing a home. Mayer and Engelhardt (1996) show that about one in ten first-time buyers benefit from gifts in purchasing a home. Since these gifts are likely to be received at the time of closing on the purchase, they are not captured in our wealth measures at the beginning of the period when homeownership occurs.

buyers and the large difference in the share with some financial assets, it is not surprising that the statistical model finds that low levels of liquid assets are the most critical in predicting which households will become owners.

Exhibit 4
Comparison of Liquid Financial Assets and Net Worth of Buyers and Non-Buyers

Liquid Financial Assets	Non-Buyers	Buyers
Average	$10,884	$15,270
Median	$160	$928
Distribution of Households by Liquid Financial Assets		
$0 or less	43%	23%
$1 to $999	27%	28%
$1,000 to $4,999	13%	20%
$5,000 to $19,999	9%	15%
$20,000 and higher	8%	14%
Net Wealth		
Average	$14,500	$25,454
Median	$750	$4,104
Distribution of Households by Net Wealth		
$0 or less	40%	30%
$1 to $999	11%	6%
$1,000 to $4,999	17%	17%
$5,000 to $19,999	20%	25%
$20,000 and higher	12%	22%

Source: Authors' tabulations of 1996 SIPP Panel, Wave 3.

Exhibit 4 also presents information on the average and distribution of net wealth for buyers and non-buyers. Net wealth is a comprehensive measure of each household's financial holdings, including the value of all financial, real estate, business, and vehicle wealth less all debt. This information is meant to shed light on whether there might be more substantial differences in the ownership of other assets between buyers and non-buyers, suggesting that liquid financial assets may be too restrictive a category of wealth for predicting ownership. However, in general, the differences between buyers and non-buyers are similar to those observed for liquid financial assets. There is a somewhat larger disparity in net wealth between buyers and non-buyers, with the average net wealth of buyers 75 percent higher than the average among non-buyers. The disparity in the medians for net wealth is also larger than for liquid financial assets, with the median net wealth of buyers of $4,104 compared to $750 for non-buyers. Nonetheless, many buyers are still found to have little or no wealth as 30 percent have zero or negative net wealth and 6 percent have net wealth of only $1 to $999. Furthermore, for many households, much of their net wealth is based on their net equity in vehicles. When vehicle net wealth is excluded from total net wealth, the median net wealth of both buyers and non-buyers is $0. In fact, 61 percent of buyers have net wealth excluding vehicle wealth of less than $1,000. In short, while there is a greater difference in buyers and non-buyers in net wealth, much of

this difference is due to net vehicle wealth, which seems unlikely to be a source of savings for homeownership.

As a final test of the goodness of fit of the estimated model, Exhibits 5a through 5d compare the actual and estimate cumulative probability of homeownership for the entire sample of renter households and separately for all low-income households, blacks, and Hispanics.[27] The estimated cumulative probability is the weighted average of the cumulative probability for each individual household.[28] In general, the predicted level of homeownership attainment comes fairly close to the actual share by the end of the three-year period over which households are tracked. However, in all cases the actual attainment of homeownership is more rapid than predicted and there is a greater decline in the actual transition to homeownership over time than predicted. The result is that the predicted level of homeownership lags the actual level over most of the initial waves but by the end of the period the predicted level of homeownership slightly exceeds the actual level. Given the difficulties in predicting the exact timing of homeownership over the three-year period, the simulations will focus on the share of households estimated to attain homeownership by the end of the three-year period rather than the exact timing of homeownership attainment. Also, given the slight variation between the actual level of homeownership attainment and the level estimated by the model, the impact of downpayment assistance will be derived by comparing the baseline estimate of homeownership attainment with an estimate derived by increasing each household's level of liquid financial assets. The simulation approach and results are discussed in detail in the next section.

[27] Low-income households are defined as those with income of 80 percent or less of area median income at the time of Wave 3. See footnote 4 for more details on how area median income is defined.

[28] Wave 3 sample weights are used to create these weighted averages. Weights are used in these exhibits since the simulations will employ weights in order to provide estimates of the number of households that could be induced to purchase a home through downpayment assistance. Previous exhibits have not employed weights as the estimated model did not use weights and these exhibits were intended to shed light on the observations used to estimate the model.

Exhibit 5a
Comparison of Actual and Estimated Cumulative Purchase Rates for All Renter Households

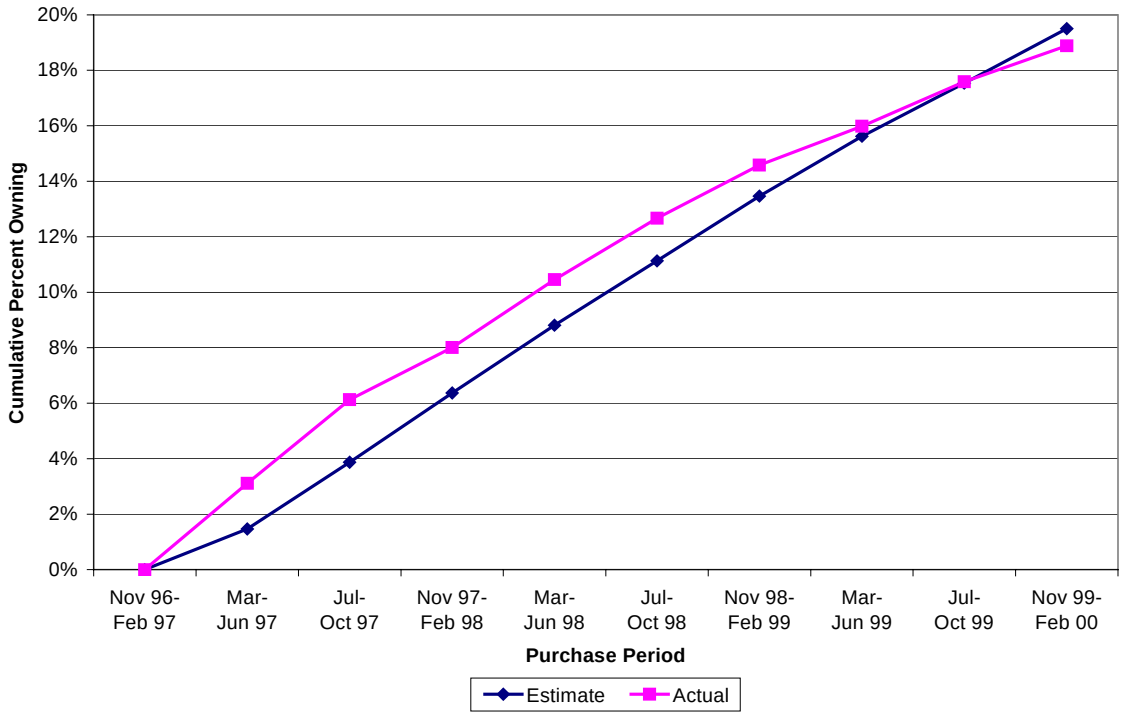


Exhibit 5b
Comparison of Actual and Estimated Cumulative Purchase Rates for Low-Income Renter Households

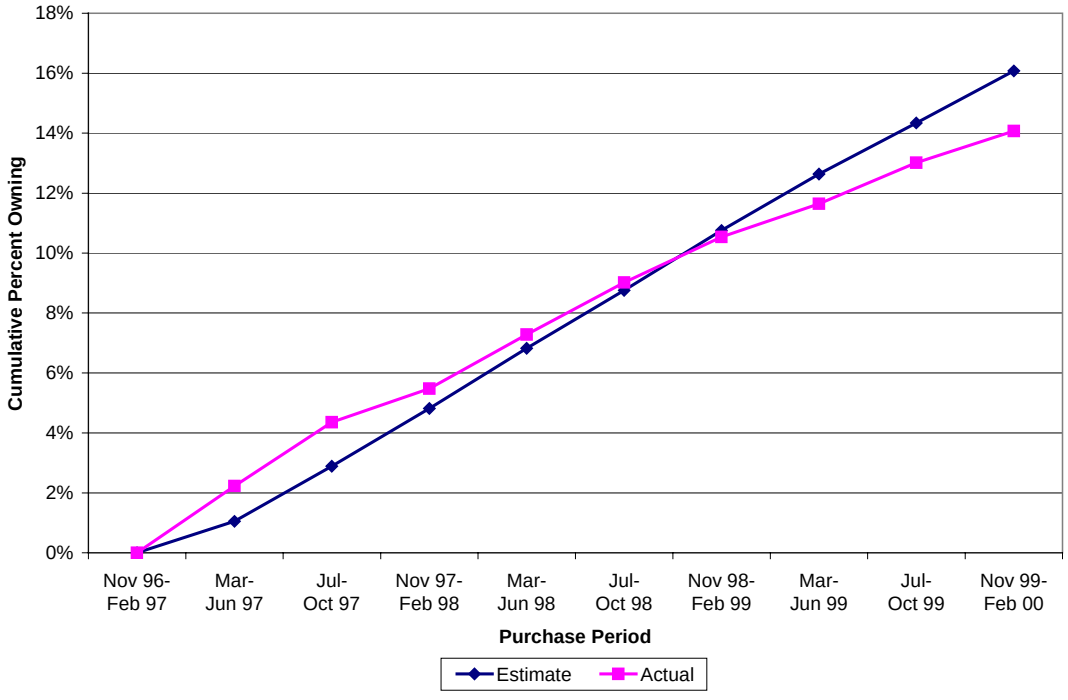


Exhibit 5c
Comparison of Actual and Estimated Cumulative Purchase Rates for Black Renter Households

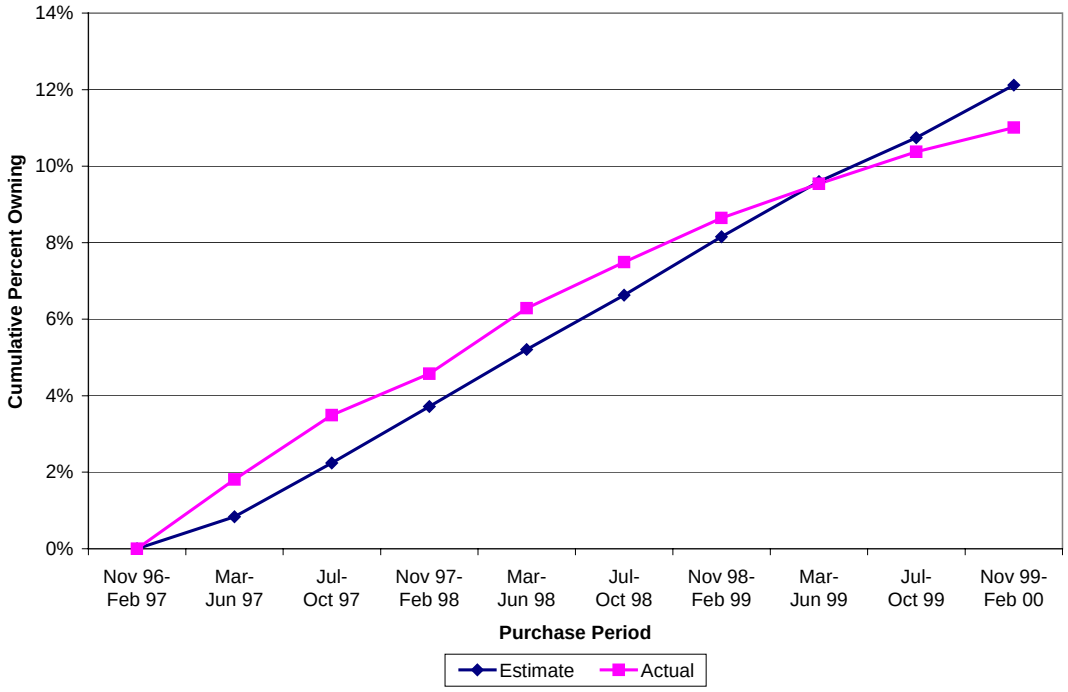
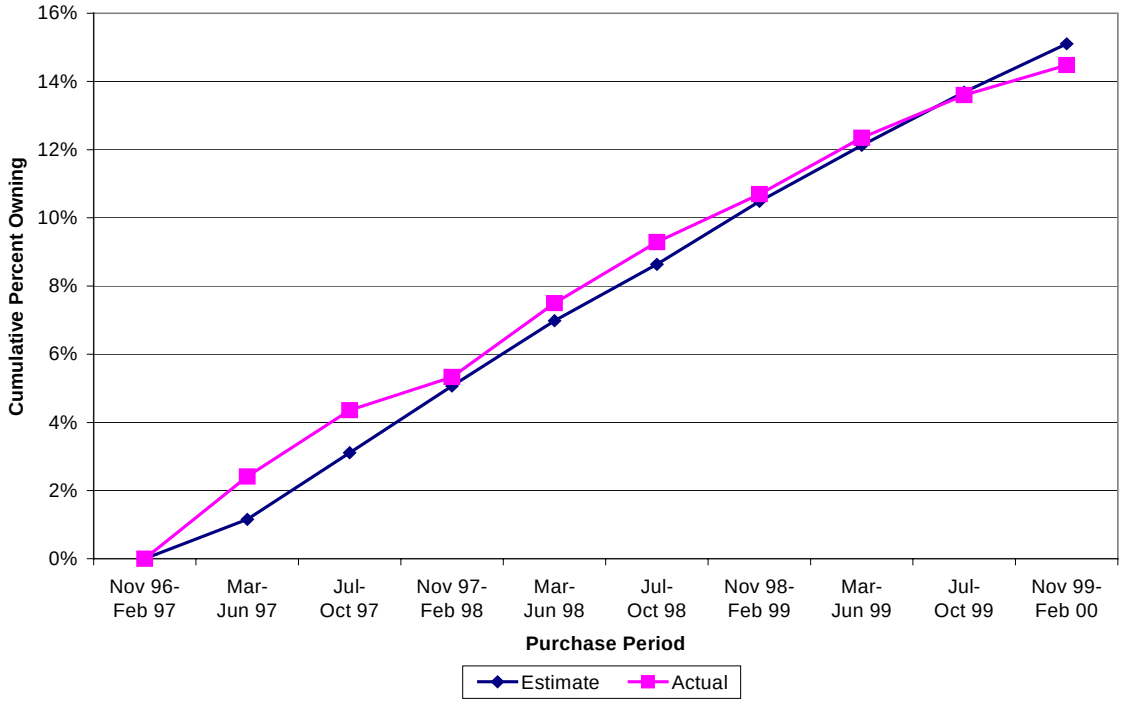


Exhibit 5d
Comparison of Actual and Estimated Cumulative Purchase Rates for Hispanic Renter Households



5. Simulating Downpayment Assistance

Exhibit 6 summarizes the results of simulations where households are provided grants of $1,000, $5,000 and $10,000.[29] The baseline estimates indicate that over the three-year tracking period, 6.3 million renter households would become homeowners, including 3.8 million low-income renters, 0.7 million black renters, and 0.6 million Hispanic renters. When the liquid assets of renters are increased by $1,000, simulating the provision of this amount of downpayment assistance, the number of homebuyers is estimated to increase by 943,000 overall, including 708,000 low-income buyers, 152,000 black buyers, and 143,000 Hispanic buyers. This represents increases of from 15 to 22 percent above the baseline estimates of the number of homebuyers. The provision of $5,000 in downpayment assistance is simulated to produce an increase of 1.8 million additional homebuyers over the period, including 1.3 million low-income buyers, 279,000 black buyers, and 260,000 Hispanic buyers. Finally, given simulated downpayment assistance of $10,000, the number of homebuyers is estimated to increase by 2.1 million, including 1.6 million low-income homebuyers, 334,000 black homebuyers, and 309,000 Hispanic buyers.

In comparing the impact of $1,000 in downpayment assistance with $5,000 in assistance, note that despite the fact that the level of downpayment assistance was increased by five fold, the estimated number of additional homebuyers increases by less than a factor of two. This result can be traced back to the magnitude of the coefficients on the liquid financial asset splines. As previously noted, the largest impact is associated with financial assets between $1 and $999. Increases in liquid financial assets between $1,000 and $5,000 have a much smaller impact on the probability of homeownership, and the impact of increases beyond $5,000 are smaller still. Thus, when $10,000 in downpayment assistance is simulated, the number of renter households estimated to achieve homeownership over the three-year period is only a little more than twice the increase associated with downpayment assistance of $1,000 – or one-tenth the level of assistance. These results suggest that a small amount of financial assistance can go a long way toward enabling homeownership.[30]

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[29] Simulations were also run with grants of 1 percent, 5 percent, and 10 percent of the area median house price. The results were very similar to those using fixed dollar amounts since the average median house price is $115,500 and thus these percentage grants are on average quite similar to $1,000, $5,000, and $10,000 grants. While there may well be differences in the geographic impact of these two approaches to downpayment assistance, given the small sample sizes in specific market areas it is not possible to evaluate these differences. As a result, the results presented here are exclusively for the fixed dollar amount grants.

[30] It is also important to consider that the levels of wealth needed to achieve homeownership are understated by the data available in the SIPP. Those seeking to purchase a home may accumulate savings rapidly in the months prior to buying. Since the data on wealth is captured by the SIPP only every 12 months, some amount of wealth accumulation may not be captured by the data. In addition, households may benefit from gifts from family members at the time of purchase, which would also not be captured here. For these reasons, the analysis may understate the importance of wealth.

Exhibit 6
Simulated Impact of Downpayment Assistance on the Number of Homeowners and Estimated Program Costs

	All Households	Low-Income	Black	Hispanic
Initial Renter Households	32,037,380	23,533,749	5,651,290	4,283,615
Baseline Estimate of Homeowners	6,248,337	3,784,410	684,857	647,008
Simulated Homeowners Under Alternative Levels of Downpayment Assistance				
$1,000	7,191,107	4,492,016	837,106	789,734
$5,000	8,021,048	5,089,272	963,534	906,714
$10,000	8,393,399	5,348,779	1,018,647	956,280
Percentage Increase in Homeowners from Downpayment Assistance				
$1,000	15%	19%	22%	22%
$5,000	28%	34%	41%	40%
$10,000	34%	41%	49%	48%
Net Gain in Homebuyers from Downpayment Assistance				
$1,000	942,770	707,606	152,249	142,727
$5,000	1,772,712	1,304,862	278,677	259,706
$10,000	2,145,063	1,564,368	333,791	309,272
Estimated Program Cost if Only Net New Homebuyers are Subsidized ($ millions)				
$1,000	943	708	152	143
$5,000	8,864	6,524	1,393	1,299
$10,000	21,451	15,644	3,338	3,093
Estimated Program Cost if All Homebuyers are Subsidized ($ millions)				
$1,000	7,191	4,492	837	790
$5,000	40,105	25,446	4,818	4,534
$10,000	83,934	53,488	10,186	9,563

Note: Estimates are of number of renter households that become homeowners at some point over the three year period of observation.

One downside of the effectiveness of even modest amounts of downpayment assistance is that if this assistance were universally available, the cost of such a program would be quite high. As shown in Exhibit 6, assuming that only low-income households would be eligible for assistance, the simulation results indicate that under the assumption of $1,000 in downpayment assistance, 4.5 million renter households would become homeowners over the three-year period. If all of these households took advantage of available assistance the cost of the program would be $4.5 billion. However, since a large majority of these households would be expected to become owners even without downpayment assistance being available, many households would be unnecessarily subsidized. If it were somehow possible to identify only those households who would purchase only with assistance, the cost of the program over three years would be $708 million – an amount close to the maximum of $200 million

per year allowed under the American Dream Downpayment Initiative.[31] If the $5,000 grant program were implemented – which is the average amount assumed by the American Dream Downpayment initiative – the number of low-income homebuyers is estimated to be 5.1 million, including 1.3 million more than expected without this level of assistance. The cost of this program would $25.4 billion if all buyers receive assistance, or $6.5 billion if only those who need assistance to purchase could be identified.

6. Summary of Findings and Policy Implications

This study has focused on evaluating the importance of liquid financial wealth for enabling homeownership. Survival analysis of data from the 1996 SIPP panel finds that liquid financial assets are statistically significant predictors of homeownership. While the importance of wealth in predicting homeownership is in keeping with the findings of previous research, a somewhat surprising finding of this analysis is that it is initial savings that are most strongly associated with the probability of becoming a homeowner. Specifically, savings in the neighborhood of $1,000 were found to provide the strongest indication of the likelihood of a transition from renting to owning, while savings between $1,000 and $5,000 only moderately increased this probability, and savings between $5,000 and $20,000 added only slightly to the likelihood.

The pattern is somewhat surprising as $1,000 would appear to be a trivial amount of money compared to the cost of a home. With a median house value in the markets studied of about $120,000, it would be expected that several thousand dollars in savings would be the minimum amount needed. Yet about half of the homebuyers over the three-year period had less than $1,000 in liquid assets at the start of the period. What might account for this pattern? One possibility is that given the growing availability of low downpayment mortgages, relatively little wealth is, in fact, needed to purchase a home. Another possibility is that the act of savings signals the desire on the part of a household to become a homeowner. While the level of liquid financial assets is low when we observe it, households may be able to accumulate savings fairly rapidly in the months leading up to home purchase – a run up that may not be captured by the once-a-year wealth estimates provided by the SIPP. It is also possible that households rely on gifts from family members, which is a source of funds that is not captured by the survey. Finally, it is also possible that the SIPP does not provide an accurate estimate of household wealth. While recent analysis of the SIPP does find shortcomings in this area, most of the undercounting is among wealthy households and so should not affect the wealth estimates of the low-income and low-wealth households of interest for this study.

[31] One way to try to ensure that assistance is targeted at those who truly need help to become an owner would be to impose some costs on the use of government assistance. But since these buyers will be facing financial hurdles in qualifying to buy a home, the payment of these costs would probably have to be deferred until some years after the initial purchase. Among the approaches that could be used would be some form of equity sharing at the time of resale of the property in proportion to the percentage of the original price that was financed with government assistance or a loan that did not begin to require payments until five or ten years after purchase.

Given the importance of low levels of liquid financial assets on the probability of homeownership in the estimated model, the simulations suggest that small amounts of downpayment assistance can be very effective at stimulating fairly large numbers of renter households to become homeowners. Downpayment assistance of as little as $1,000 is simulated to entice 700,000 additional low-income households to purchase a home, a 19 percent increase from the baseline estimate of the number of homebuyers absent any assistance. Reflecting the finding from the survival model that there is a diminishing impact of higher levels of savings on the probability of buying a home, higher levels of assistance do not have as large a marginal impact on the number of homebuyers. Assistance of $5,000 per household is simulated to increase the number of low-income homeowners by an additional 15 percent beyond the gain from $1,000 in assistance, while assistance of $10,000 is simulated to increase the number of buyers by an additional 7 percentage points beyond the gain associated with $5,000 in assistance.

While the simulation results are encouraging about the efficacy of downpayment assistance, if $1,000 in downpayment assistance were made available to all low-income households the cost of such a program could be quite high. If all low-income households were eligible for assistance, the cost would be as high as $4.5 billion over three years. But if assistance could be limited to only those households who would only purchase with assistance, the cost would be a more reasonable $700 million over three years -- a level that is in keeping with the American Dream Downpayment Initiative that authorizes expenditures of up to $200 million per year.

In interpreting the findings from these simulations it is important to bear in mind two important caveats. First, these results are based on analysis of a sample of households from a period between 1997 and 2000. It is not known whether the same homeownership propensities will be evident in future periods. Second, it may well be that the existence of a small amount of savings is commonly associated with a decision by a renter household to pursue homeownership. That is, households may choose to not accumulate any savings until they have made a decision to pursue some goal requiring savings, such as starting a business, returning to school, or purchasing a home. Since pursuit of homeownership may be the most common motivation for beginning to save, the presence of savings may be an indication that the household has decided to attempt to buy a home. If that is the case, the model may be overstating the importance of the savings itself as a predictor of homeownership. It may well be that the availability of downpayment assistance will not stimulate the desire to become a homeowner that is evident in these renter households in the SIPP.

But this interpretation suggests an alternative policy approach for stimulating homeownership. Initial savings activity may predict homeownership in part because it indicates that households have enough control over their financial circumstances to begin accumulating savings. In addition, the household may well be motivated to begin savings in the belief that homeownership – or some other financial goal – is attainable. Based on this scenario, another policy approach aside from downpayment assistance that might spur homeownership is to support savings efforts by households to accumulate the funds needed to buy a home, such as through individual development accounts. Such savings incentives could also be coupled with support for financial management training to help households develop the skills needed to manage their finances to the point where they can accumulate savings. The findings from this analysis suggest that a little savings can go a long way toward enabling homeownership.

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